(12) UK Patent Application (19) GB (11) 2 323 297 (13) A

(43) Date of A Publication 23.09.1998

(21) Application No 9705907.5

(22) Date of Filing 21.03.1997

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(51) INT CL[6]
A63B 63/00

(52) UK CL (Edition P)
A6D D13B

(56) Documents Cited
GB 2270004 A **GB 2204800 A** **GB 1509603 A**
GB 1478282 A **US 5419565 A** **US 4014546 A**

(58) Field of Search
UK CL (Edition O) **A6D D13B D13C D7A3**
INT CL[6] **A63B 63/00 69/00 69/38**

(54) Abstract Title
Sports training or practice apparatus

(57) The apparatus, for example for practice of ball control skills for a ball sport, includes a wall (18) having one or more target areas (1-4) depicted graphically thereon. Sensors, such as pressure sensitive switches (20, 32) detect impact of the ball in a target area. An electronic circuit (36) generates an audio and/or visual interactive output, for example, of a points score. The apparatus may include plural walls which are monitored concurrently to enable several players to practice.

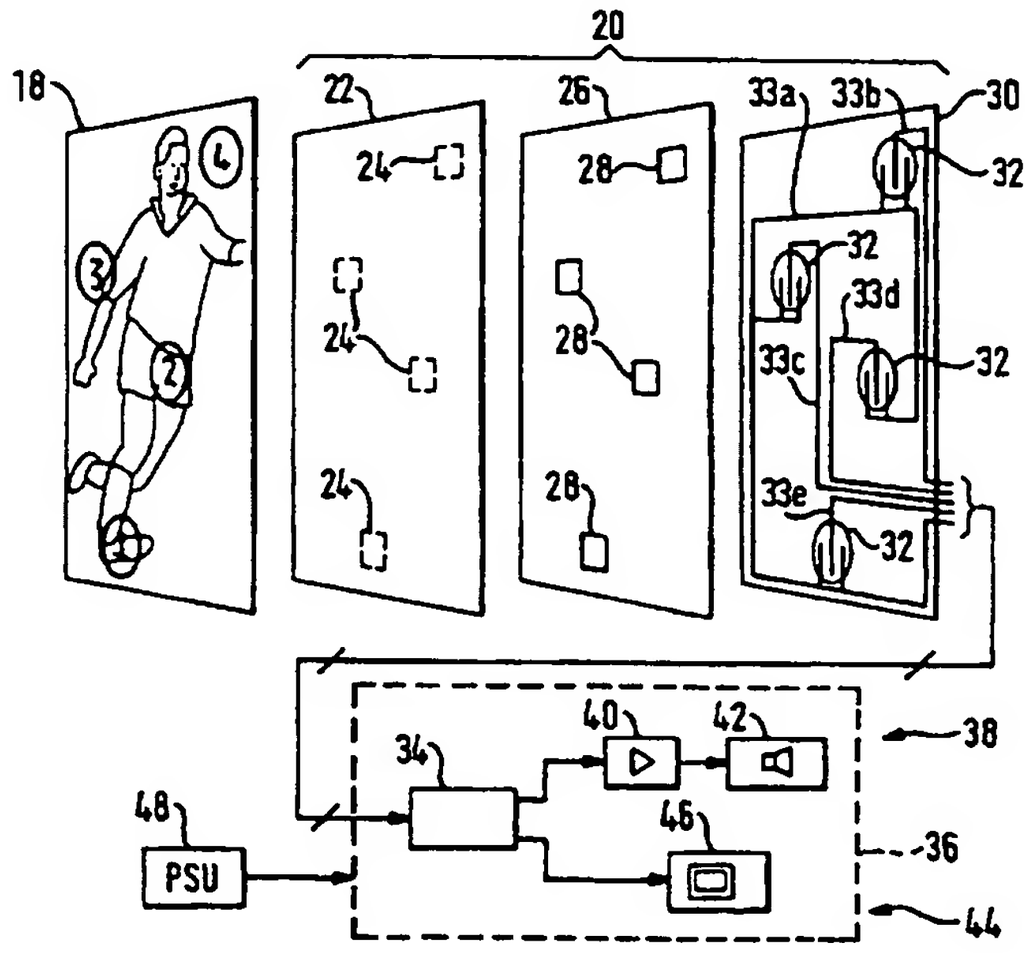

FIG.2

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At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

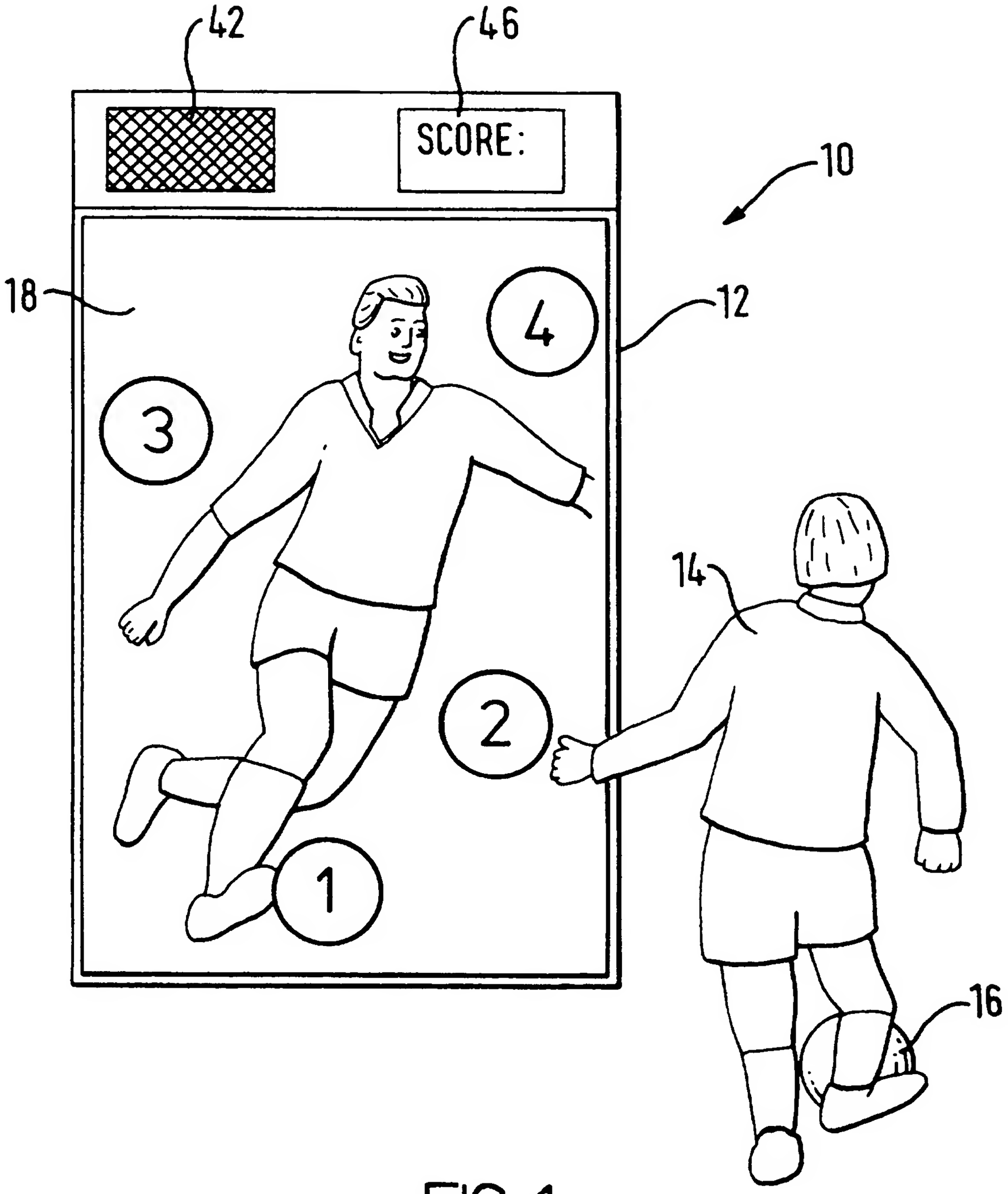

FIG. 1

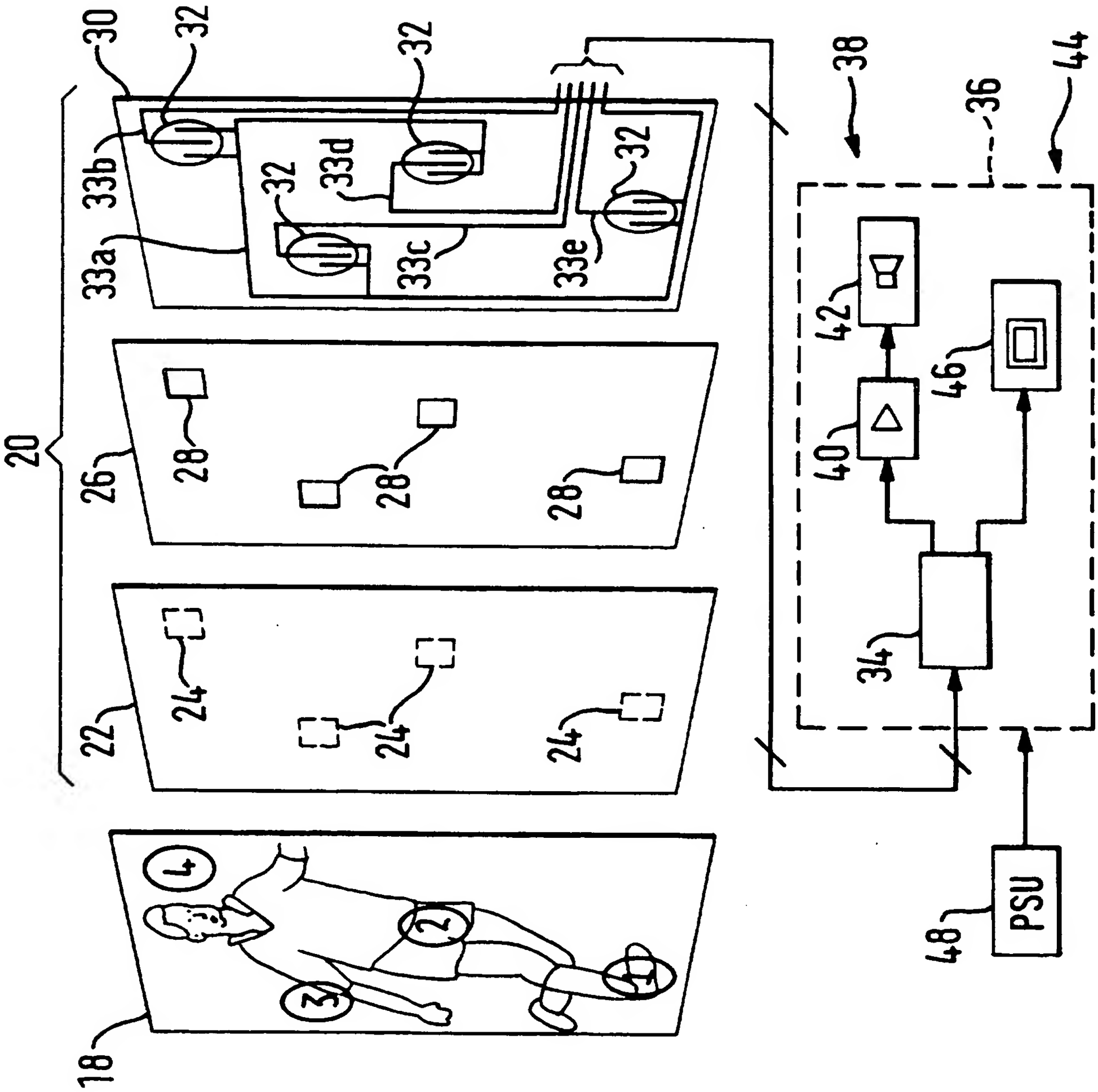
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FIG.2

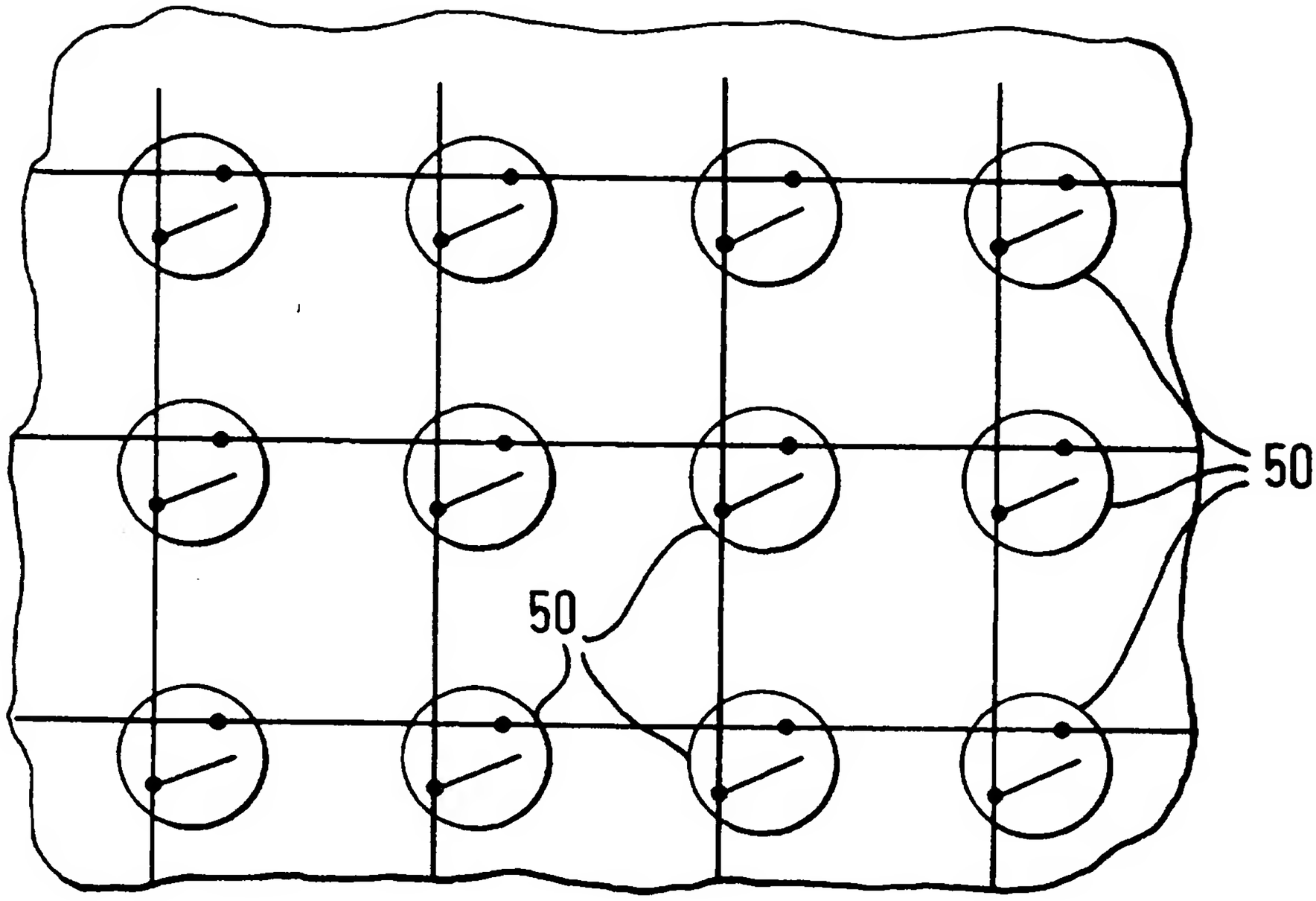

FIG. 3

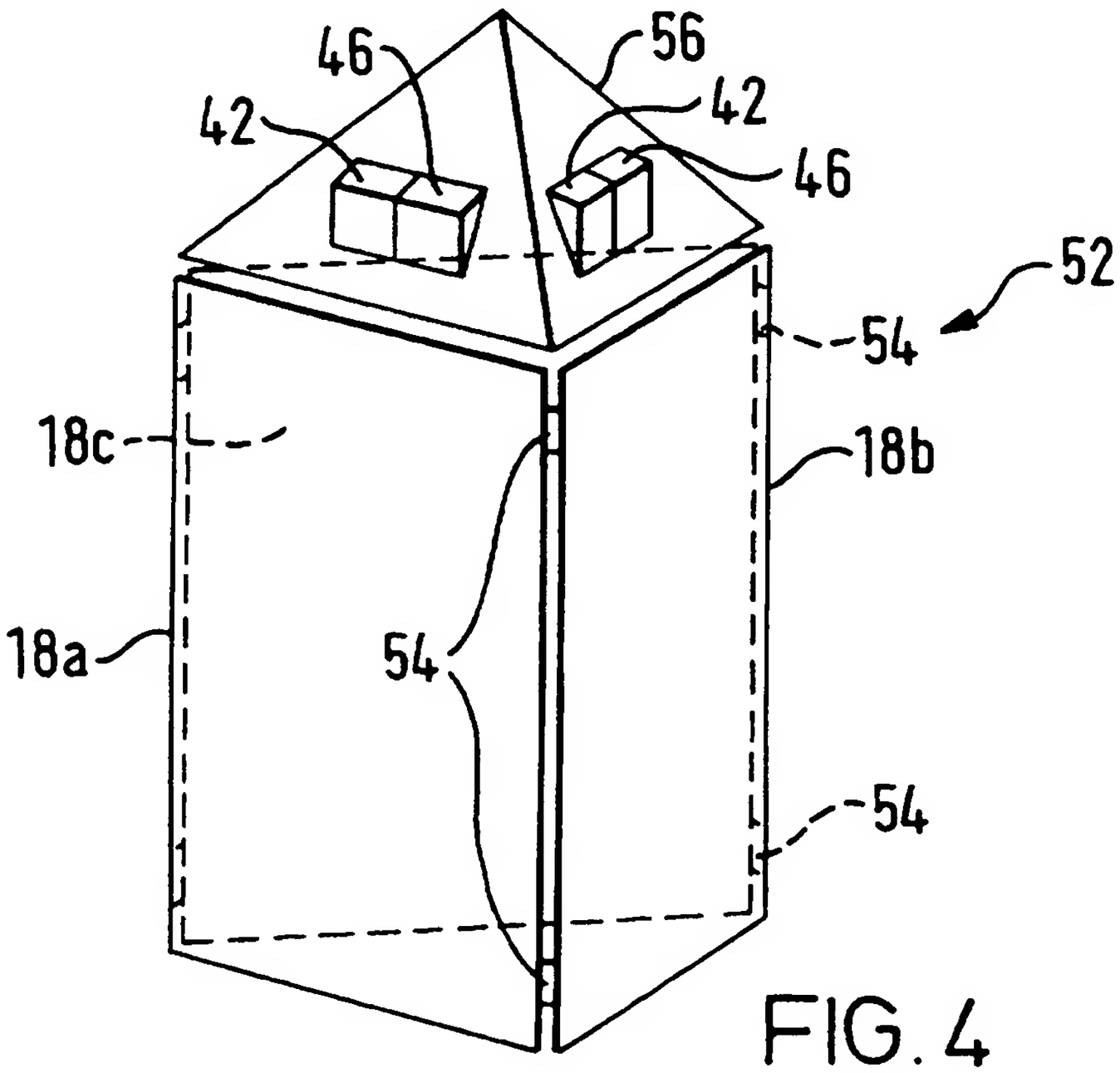

FIG. 4

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Sports Training or Practice Apparatus

This invention relates to apparatus for use in sports training or practice. The invention is particularly suitable for the training or practising of ball games, for example, football, but it is not limited only to ball games.

Walls are used by professional sports people, professional trainers, coaches and the general public, against which ball games can be played, and general ball control skills practised. Some walls include special graphics, such as lines defining target areas, to help the player practise or play a game against the wall.

However, such walls are relatively expensive to build or install, and are in essence merely painted surfaces. Moreover, painted features can only offer "passive" training. There is no interaction with the wall other than the bouncing of the ball on the wall. In some cases, it may be difficult to determine whether the ball has landed precisely on, or slightly off, target, particularly if the ball is travelling very quickly. Furthermore, it may be difficult to keep an accurate points score of the training or practice session, particularly if several people are practising at the same time.

The present invention has been devised bearing the above in mind.

In one aspect, the invention provides a wall against which a person can aim, sensing means for generating positional information dependent on the position of contact against the wall, and output means responsive to the sensing means for generating an audio and/or visual output.

With an apparatus according to the invention, an interactive training or playing wall can be provided, which can produce audio or visual interactive information when, for example, a ball strikes the wall. The positional information can be used to asses whether the contact is at one or more predetermined or pre-definable target regions,

and a visual or audio output signal then generated in response to the positional information.

The output may, for example, be in the form of a score or other measure of accuracy, presented audibly or visually, or a message of congratulation, encouragement or of consolation, a sponsor's message, a cheer or any other interactive information, effect or message.

In another aspect, the invention provides ball-sport practice apparatus comprising a wall against which a ball can be directed, and means for detecting when the ball impacts against one or more target areas or positions on the wall and for generating an interactive output signal in response thereto.

In a further aspect, the invention provides ball-sport practice apparatus comprising a wall against which a ball can be directed, and at least one pressure sensitive switch for sensing impacts against the wall, the pressure sensitive switch comprising first and second layers of or carrying conductive material and spaced apart by an apertured electrically insulating layer or frame, the impact of a ball causing the first layer to touch the second layer.

In a yet further aspect, the invention provides ball-sport practice apparatus comprising a wall against which a ball can be directed, and a matrix of pressure sensitive switches for sensing impacts at pre-defined positions on the wall, the matrix comprising a first layer carrying one or more conductive areas, a second insulating layer having apertures therein for defining pressure switch positions, and a third layer having one or more conductive areas defined thereon, the first and third layers making contact through a said aperture when pressure is applied at a switch position.

Embodiments of the invention are now described by way of example only, with reference to the accompanying drawings, in which:

Fig. 1 is a schematic view showing an interactive training wall;

Fig. 2 is an exploded view showing the structure of the wall;

Fig. 3 is a schematic view of an alternative sensor switch system; and

Fig. 4 is a perspective view of a modified embodiment which has multiple surfaces.

Referring to Figs. 1 and 2, an interactive training/practice apparatus 10 comprises a wall 12 against which a player 14 can aim a ball 16. In the present embodiment, the apparatus is for football practice, and the wall 12 carries a colour graphics sheet 18 of any suitable material, for example, of paper, vinyl or plastics, on which are marked target areas 1, 2, 3 and 4 at which the player should aim the ball. The graphics sheet 18 also carries a picture, for example, a life-size action picture of a footballer to whom a simulated pass is being made by kicking the ball against the wall. Alternatively, any suitable custom made graphic or scene can be depicted, such as a set of goal posts, or a tennis net (for practising tennis). The target areas may be implicit (i.e. within the goal, or above the tennis net) instead of being explicitly marked as numbered areas.

Referring to Fig. 2, the wall 12 includes, behind the graphics sheet, a switch matrix 20 for detecting whether a ball impacts against the target areas. The switch matrix 20 consists of a first layer 22 having conductive regions 24 thereon at positions in register with the target areas 1-4, a separation layer 26 having apertures 28 therein at positions in register with the target areas 1-4, and a circuit board 30 carrying a printed circuit pattern with switch contacts 32 in register with the apertures 28. In use, the separation layer 26 normally holds the first layer away from the circuit board 30. When a ball is kicked against the graphics sheet 18 and hits a target area 1-4, the sheet 18 flexes, causing the conductive region 24 of the underlying layer 22 to be pressed through the respective aperture 28 into contact with the switch contacts 32 to close the switch. The separation layer 26 may be resiliently compressible to accommodate the

flexing movement. For example, the separation layer could be made of polyurethane or polystyrene foam. Alternatively, the separation layer may be generally non compressible, for example, of paper or of card, and the switch matrix would then relying on resilient flexing of the first sheet 22 into contact with the circuit board 30 to create an electrical circuit under the impact of a ball.

As a modification of the above, the first layer 22 could be omitted, and the conductive regions 24 provided on the rear face of the graphics sheet 18. In either case, the conductive regions may be printed, or formed by vapour deposition of, for example, aluminium. Electrical connections could also be made directly to the conductive regions 24 as one side of the electrical switches. The individual conductive regions could also be replaced by a single conductive area covering the whole of the area of the sheet 18 or 22.

In this embodiment, the circuit board 30 has five conductive paths 33a-e. Path 33a is a common path for the switch contacts 32, and the four paths 33b-e are the respective signal paths for the four switch contacts 32. Such an arrangement provides an output identifying which, if any, of the switches has been activated by the ball impact, thereby identifying the respective target area 1-4. However, if it is not necessary to identify the particular target area hit, the switch contacts could be coupled electrically in parallel if desired.

Output signals from the circuit board 30 are coupled to a control circuit 34 of an electronic circuit 36 which may have an audio output channel 38 consisting of an amplifier 40 and a loudspeaker 42, and/or a visual output channel 44 consisting of a video monitor or a digital or pixel display 46, such as an LED or LCD unit. The control circuit 34 determines from the switch signals whether the ball has contacted a target area of the wall, and can generate any desired output through the audio and/or visual channels. For example, the control circuit 34 may calculate a running score of points for digital display or message presentation. Additionally, or alternatively, the

control circuit can generate visual or audio effects, for example, when the ball hits the wall on target. In this embodiment, the control circuit includes a micro-controller and a sound effects/speech generator, both of which are well known per se. A power supply 48 for the electronic circuit 36 may be provided by batteries (for example re-chargeable batteries), or from a mains supply.

The switch construction illustrated in Fig. 2 produces outputs when a ball impacts against one or more pre-defined target areas. Additionally, if desired, further switch contact areas may be provided to detect whether the ball impacts outside the target areas, corresponding to inaccurate playing of the ball. The control circuit may then utilise this information to calculate percentage accuracy of the player's shots.

It will be appreciated that different graphics sheets 18 may be substituted and used with the same switch matrix provided that the target areas are in the same places. Alternatively, the graphics sheet 18 and one or more parts of the switch matrix 20 may be interchangeable, for example, as a unit so that a replacement consisting of a different graphics sheet 18 with its own matching contact switch regions can be used. This would allow a graphics sheet having different target areas to be used.

A yet further alternative would be to employ a permanent switch matrix consisting of a grid pattern of contact or impact switches 50, as depicted in Fig. 3. The grid pattern covers substantially the entire playing area of the graphics sheet 18. When a new graphics sheet is fitted, the control circuit 34 would have to be programmed to recognise which switches correspond to the target areas, and which other switches correspond to off-target areas, of the new sheet 18.

The wall 10 may be free-standing, or it may be mounted on, or placed against, a support wall, for example, a concrete wall, hardboard surface, timber surface, glass surface, material surface, stud partition wall, or any hard surface. If desired, more than one graphics sheets (or a compound graphics sheet defining plural playing areas)

may be used. Fig. 4 illustrates a free-standing frame system 52 providing multi-wall playing surfaces; three walls 18a, 18b and 18c are provided in this embodiment. The walls 18a, 18b and 18c are coupled to each other at adjacent edges by hinges 54, or other couplings which, in this embodiment, enable the frame to be collapsed or dismantled easily. The electronic circuit 36 is contained within the frame structure, and the audio/visual output devices 42, 46 provided in a roof 56 of the frame structure.

If more than one playing surface is provided, as in the embodiment of Fig. 4, the control circuit 34 may receive separate switch output information from each playing surface, and be operable to keep two or more player's scores together.

Although the above embodiments employ contact, or impact, switches for sensing the contact position of a ball against the playing surface, it will be appreciated that any suitable sensing arrangement may be used as desired. For example, a suitable optical sensing system may include optical (or infra-red) emitter strips placed along orthogonal edges of the playing surface, and optical receiver strips placed along corresponding opposite edges. A ball arriving against the surface would interrupt the light beams at specific positions, and the position of the ball could be determined from the two-dimensional light beam interruption information produced.

Although the invention has been described above in the context of football training, it will be appreciated that the invention is suitable for training or practising many sports, especially but not exclusively, ball sports.

Although a specific example of the invention has been described above, the skilled man will appreciate that many modifications can be made within the scope of the invention. While features and aspects of the invention believed to be of significance have been mentioned in the appended claims, the Applicant claims protection for any novel feature or combination of features described herein and/or illustrated in the drawings, irrespective of whether emphasis has been placed thereon.

CLAIMS

1. Sports apparatus comprising a wall against which a person can aim, sensing means for generating positional information dependent on the position of contact against the wall, and output means responsive to the sensing means for generating and audio and/or visual output.

2. Apparatus according to claim 1, wherein the sensing means comprises means for sensing impact at one or more pre-defined or pre-definable positions or regions.

3. Apparatus according to claim 2, wherein the sensing means is operative to generate a first output signal in response to impact in a first region, and to generate a second output signal in response to impact in a second region.

4. Apparatus according to claim 1, 2 or 3, wherein the sensing means comprises one or more pressure responsive switches.

5. Apparatus according to claim 5, wherein the sensing means comprises a first layer carrying one or more conductive areas, a second insulating layer having more or more apertures therein for defining pressure switch positions, and a third layer having one or more conductive areas defined thereon, the first and third layers making contact through a said aperture when pressure is applied at a switch position.

6. Apparatus according to any preceding claim, wherein a front face of the wall bears graphical information defining one or more target areas.

7. Apparatus according to claim 6, wherein the sensing means comprises means for sensing an impact in a said target area.

8. Apparatus according to any preceding claim, wherein the output means comprises means for determining and presenting a score.

9. Ball-sport practice apparatus comprising a wall against which a ball can be directed, and means for detecting when the ball impacts against one or more target areas or positions on the wall and for generating an interactive output signal in response thereto.

10. Ball-sport practice apparatus comprising a wall against which a ball can be directed, and at least one pressure sensitive switch for sensing impacts against the wall, the pressure sensitive switch comprising first and second layers of or carrying conductive material and spaced apart by an apertured electrically insulating layer or frame, the impact of a ball causing the first layer to touch the second layer.

11. Ball-sport practice apparatus comprising a wall against which a ball can be directed, and a matrix of pressure sensitive switches for sensing impacts at pre-defined positions on the wall, the matrix comprising a first layer carrying one or more conductive areas, a second insulating layer having apertures therein for defining pressure switch positions, and a third layer having one or more conductive areas defined thereon, the first and third layers making contact through a said aperture when pressure is applied at a switch position.

12. Apparatus according to any preceding claims, comprising a plurality of said walls for enabling a plurality of persons to practice or train concurrently.

13. Sports training or practice apparatus, substantially as hereinbefore described with reference to any of the accompanying drawings.

Patent Office

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Application No: GB 9705907.5
Claims searched: 1 to 13

Examiner: Alan Blunt
Date of search: 8 May 1997

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.O): A6D (D7A3, D13B, D13C)

Int Cl (Ed.6): A63B 63/00, 69/00, 69/38

Other:

Documents considered to be relevant:

Category	Identity of document and relevant passage		Relevant to claims
X	GB2270004A	(NELSON) - whole document	1 to 4, 6 to 8
X	GB2204800A	(JONES) - whole document	1 to 4, 6 to 9
X	GB1509603	(BON) - whole document	1 to 4, 6 to 9
X	GB1478282	(BRUNSWICK) - whole document	1 to 4, 6 to9, 12
A	US5419565	(GORDON) - whole document	10, 11
X	US4014546	(STEINKAMP) - column 1 lines 40 to 47	1 to 13

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.